BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

PATENT SPECIFICATION

1,029,668

1,029,668

Date of Application and filing Complete Specification: April 12, 1965. No. 15514/65

Application made in Germany (No. S90655ia/24g) on April 21, 1964.

Complete Specification Published: May 18, 1966.

Index at Acceptance:—F2 N (6A, 6B4B, 6B5, 6B6B1, 6B7B, 6C, 6H).

Int. Cl.:—F 06 l.

COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Soot Blower for Steam Boilers

I, MARTHA BRINKER, trading as M. SPUHR & Co.—APPARATEBAU, a German Company of 58 Maxstrabe, Essen, Federal Republic of Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a soot blower for steam boilers comprising a rotating blast pipe provided with a lateral blast nozzle and insertable through the boiler shell, whereby pressure medium is blown internally against the boiler wall. Soot blowers are known wherein removal of soot deposit is effected by blasting by means of air, steam or water under pressure. The jet of the pressure medium issuing laterally from the blast nozzle during rotation of the blast pipe impinges upon the boiler wall on a spiral path if the blast pipe during rotation thereof is simultaneously slowly advanced towards the boiler interior by an axial feeding device. A disadvantage of prior art soot blowers of this type resides in the fact that those portions of the internal boiler wall commonly provided by steam pipes, being next adjacent to the blast pipe are more strongly subjected to the jet of pressure medium than the remoter portions of the internal boiler wall. The irregular impingement on the boiler wall portions is of particular disadvantage if the soot deposit shall be removed by a water jet which may not exceed a specific force so as to avoid a thermal shock. However, also when blasting by means of air or steam under pressure, the nonuniform effect of the jet of pressure medium is apparently disadvantageous.

It is the object of this invention to eliminate this disadvantage to particularly avoid different impingement upon adjacent and remoter boiler wall portions when blasting with a water jet.

This object is being accomplished in accordance with this invention by providing that the supply of pressure medium to the blast pipe is controllable by the feeding device such that it automatically increases with increasing advance. Thus, if the supply of pressure medium is made dependent on the respective position of the blast nozzle, a uniform impingement of pressure medium on a relatively large area of the internal boiler wall during the advance movement can be achieved.

The invention may be particularly advantageously realized in that a connection pipe of the blast pipe, having a blind-end bore and a triangular control opening is rotatably supported in a pressure medium cylinder mounted on the feeding device and is driven by a motor via the feed gear mechanism and that a control sleeve initially covering the control opening is sealingly guided on the connection pipe, which control sleeve with a threaded portion thereof during rotary movement of the connection pipe is screwed into an internally threaded sleeve fixedly secured in the pressure medium cylinder, thereby sliding relative to the connection pipe and increasingly releasing with the control edge thereof the passage through the triangular control opening so that the pressure medium from the pressure medium cylinder may enter through the control opening into the blind-end bore and the blast pipe.

An embodiment of this invention is presented with reference to Figs. 1 to 4 and described as follows:—

Fig. 1 schematically illustrates the arrangement of the soot blower on the boiler shell.

Fig. 2 is an enlarged section of the pressure medium cylinder in connection with the drive.

Fig. 3 is a detail view of the feeding device.

Fig. 4 is an illustration of the spiral paths impinged upon during advance and return movements of the soot blower.

A boiler shell 1 has arranged therein-front a guide rail 2 on which a carriage 3 is moving. A platform 3' of carriage 3 has mounted thereon a gear mechanism 4 and an electromotor 5 connected therewith. The electromotor 5 via a worm-wheel drive 4' of gear mechanism 4 and a pair of chain sprockets 7 loosely arranged on the rear axle 6 of carriage 3 drives a pair of chain sprockets 9, 9' on the front axle 8 thereof with strong reduction. In doing so, the smaller sprocket 9' connected with sprocket 9 engages, as is illustrated in Fig. 3, a chain 2' fixed on the guide rail 2 and rides thereon so that the carriage 3 slowly advances on the guide rail 2 towards the boiler shell 1. The platform 3' of carriage 3 has mounted thereon a pressure medium cylinder 11 connected to a flexible pressure medium line 10. A connection pipe 12 is rotatably supported in the pressure medium cylinder and rigidly connected with an output shaft 13 of the gear mechanism 4. The connection pipe 12 is in tightly threaded engagement with a blast pipe 14 having a lateral blast nozzle 15. During advance movement of carriage 3 the rotating blast pipe 14 will enter through an opening 16 of the boiler shell 1. A jet of pressure medium 17 issuing from the blast nozzle 15 blows against the sooted inside surface of the boiler shell 1 and initially impinges thereupon a short distance from opening 16. Upon further advance movement of carriage 3 the jet of pressure medium as is indicated as at 17' impinges upon the boiler wall 1 at a greater distance. Due to the rotation of the blast pipe 14 with simultaneous slow advance movement of carriage 3 the jet of pressure medium 17 describes a spiral circumferentially of the opening 16, blasting as at *a* being substantially more intensive than in the more outward area as at *b*. To achieve a uniform blasting effect *a* and *b*, provision is made in a manner to be described hereinafter, that the jet of pressure medium is wakest as at 17 and constantly increasing only reaches its full force as at 17'.

As can be seen in Fig. 2, to this end the connection pipe 12 has provided therein a blind-end bore 18 being communicated with the pressure medium chamber 20 of cylinder 11 through a triangular control opening 19. Initially, this control opening 19 is completely covered by a control sleeve 21 sealingly slidable as at 22 on the connection pipe 12. With a threaded portion 23 thereof the control sleeve 21 is screwed into an internally threaded sleeve 24 and sealed with respect to the same by a sealing ring 25. Sleeve 24 is fixedly mounted in the pressure medium cylinder 11. Now, upon rotation of the connection pipe 12 effected through the output shaft 13 of gear mechanism 4 together with the described advance drive of carriage 3, the control sleeve 21 is being screwed into the fixed sleeve 24 and in doing so slides on connection pipe 12. The transmission ratios are adjusted such that the control edge 26 of control sleeve 21 will just have reached the point of the control opening 19 after having covered a dead distance, when by the advance movement of carriage 3 the nozzle 15 of blast pipe 14 has been guided through the boiler shell 1 and has been placed into operating position. Now, the control edge 26 commences to release the control opening 19 so that pressure medium from chamber 20 may now pass into the connection pipe 12 and the blast pipe 14. Whereas initially the jet of pressure medium 17 issuing from nozzle 15 is relatively weak due to the yet small cross-section released of the control opening 19, this jet will increase with every rotation as by the control edge 26 a constantly enlarging cross-section of the control opening 19 will be released. When the control sleeve 21 has reached its end position, thus the full cross-section of the control opening 19 has been released, also the blast pipe 14 will have reached its end position by the advance movement of carriage 3, at which end position the full jet of pressure medium 17' is available for blasting the area *b* of the boiler wall 1.

A limit switch (not shown) is effective in the end positions of carriage 3 to reverse the direction of rotation of drive motor 5 so that the direction of rotation of the blast pipe 14 is reversed and the carriage 3 will move in the opposite direction. When this happens, the jet of pressure medium (17, 17') issuing from the blast nozzle 15 during advance and return movements of carriage 3 would impinge upon the boiler wall 1 on the same spiral path. To avoid this and still improve on the effectiveness of the soot blower, as is shown in Fig. 3, the pair of chain sprockets 9, 9' are not fixedly connected to the front axle 8 of carriage 3, but are loosely mounted thereon. Hub 9'' of the pair of chain sprockets 9, 9' has mounted therein a radial coupling pin 27 engaging a recess 28 extending through 180° of the front axle 8. With each change in the direction of rotation the pair of chain sprockets 9, 9' execute a half-turn before the front axle 8 is taken along by the coupling pin 27 and the carriage 3 is moved. During this idling half-turn of the pair of chain sprockets

9, 9'—with carriage 3 standing— the blast pipe 14 with the selection of suitable transmission ratios has already executed a half-turn. The result of this is that the jet of pressure medium 17, 17' during the advance and return movements of carriage 3 impinges upon the boiler wall 1 on two different spiral paths, indicated in Fig. 4 in the solid line showing as at 29 and in the broken line showing as at 30. Of course, this advance rotary movement of the blast pipe 14 while the carriage is standing may also be realized differently. For instance, instead of a single drive motor 5 two drive motors with one gear mechanism each may be provided of which the one serves for rotating the blast pipe 14 and the other for advancing the carriage 3. In the end positions of carriage 3 limit switches are effective to reverse the direction of rotation of both motors, wherein the switching device may be designed such that the motor of the advance drive is switched on with a certain delay with respect to the motor for effecting rotation, which corresponds to a 180° rotation of the blast pipe 14.

WHAT I CLAIM IS:—

1. A soot blower for steam boilers comprising a rotating blast pipe provided with a lateral blast nozzle and insertable through the boiler shell, whereby pressure medium is blown internally against the boiler wall, and further comprising a driving device effecting the rotation and the axial advance of the blast pipe, characterized in that the supply of pressure medium to said blast pipe is controllable by said driving device such that the supply of pressure medium automatically increases with increasing advance.

2. A soot blower according to claim 1, characterized in that a connection pipe of said blast pipe, having a blind-end bore and a triangular control opening is rotatably supported in a pressure medium cylinder mounted on said feeding device and is driven by a motor via the feed gear mechanism, and that a control sleeve initially covering said control opening is sealingly guided on said connection pipe, said control sleeve with a threaded portion thereof during rotary movement of said connection pipe being screwed into a internally threaded sleeve fixedly secured in said pressure medium cylinder, thereby sliding relative to said connection pipe and increasingly releasing with the control edge thereof the passage through said triangular control opening so that the pressure medium from said pressure medium cylinder may enter through said control opening into said blind-end bore and said blast pipe.

3. A soot blower according to claim 2, characterized in that a dead distance is provided for said control sleeve to reach said control opening, corresponding to an advance movement of said blast pipe from the original position to the operating position thereof.

4. A soot blower according to any of the claims 1 to 3, characterized in that said driving device with each reversal of direction of rotation effects an advance rotary movement of said blast pipe through 180° before the advance drive will commence.

5. A soot blower according to claim 4, characterized in that a feed gear mechanism actuated by said driving device has an idling range effective upon change in direction, corresponding to a 180° rotation of said blast pipe.

6. A soot blower for steam boilers, substantially as described herein with reference to and as illustrated in the accompanying drawings.

For the Applicants:
F. J. CLEVELAND & COMPANY,
Chartered Patent Agents,
Lincoln's Inn Chambers,
40-43 Chancery Lane,
London, W.C.2.

Berwick-upon-Tweed: Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd.—1966
Published at The Patent Office, 25 Southampton Buildings, London, W.C.2 from which copies may be obtained

Fig. 1

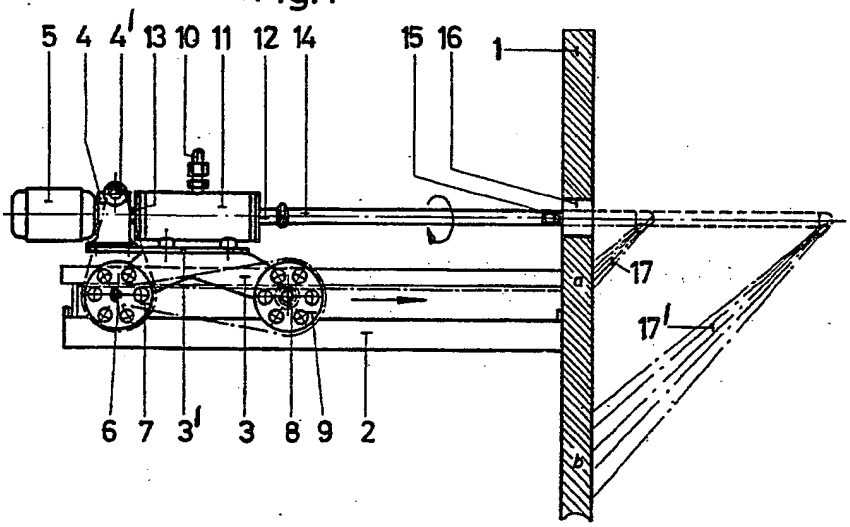
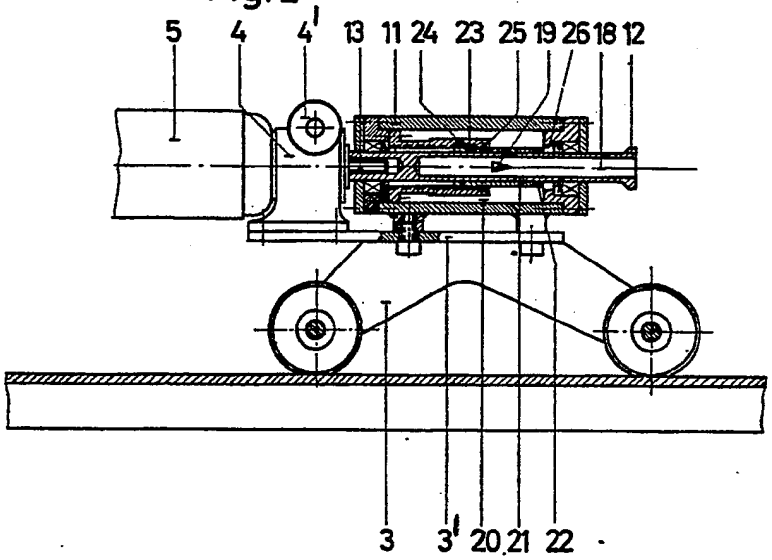


Fig. 2



1,029,668 COMPLETE SPECIFICATION
2 SHEETS

This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

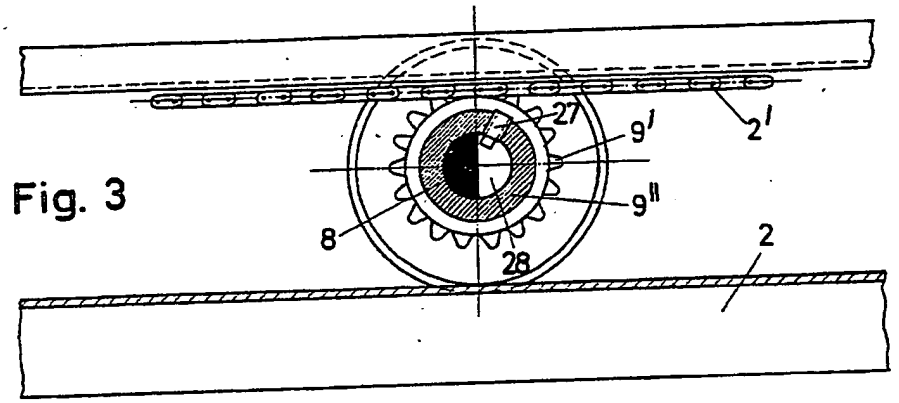


Fig. 3

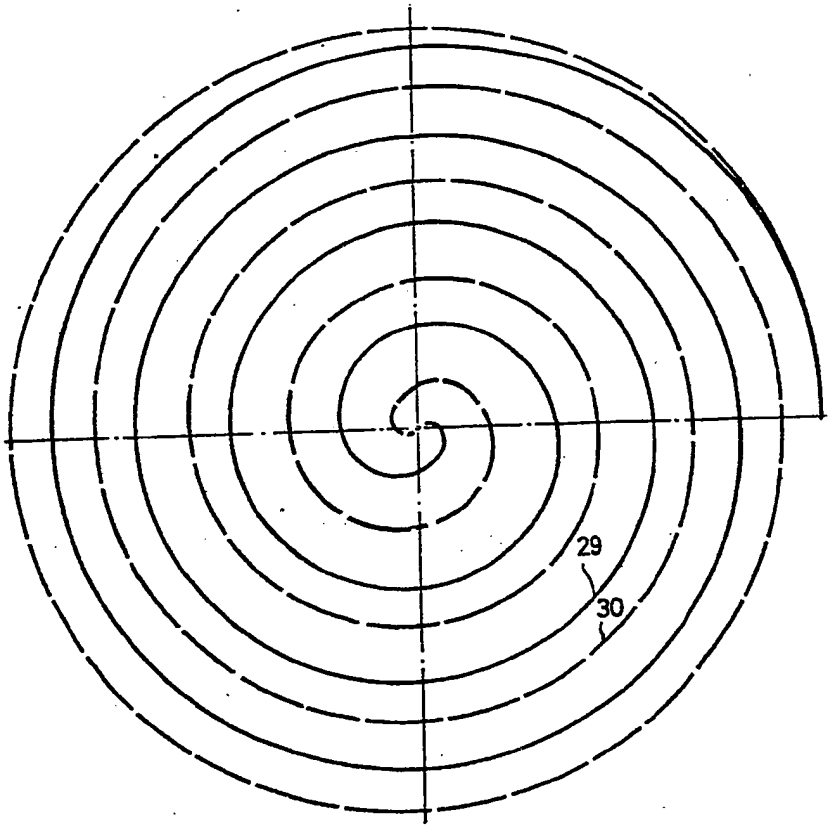


Fig. 4

1,029,668
2 SHEETS
COMPLETE SPECIFICATION
This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

Fig. 1

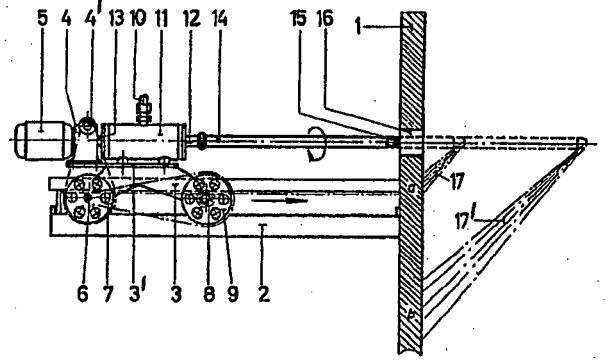


Fig. 2

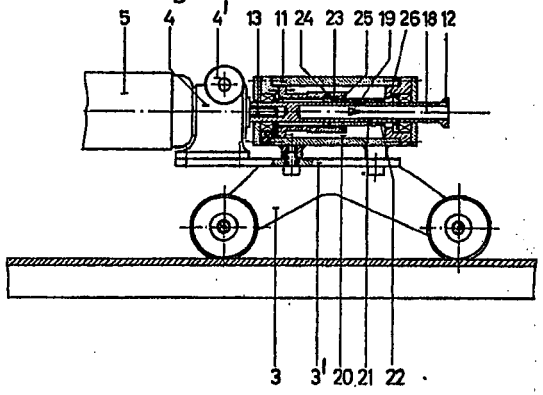
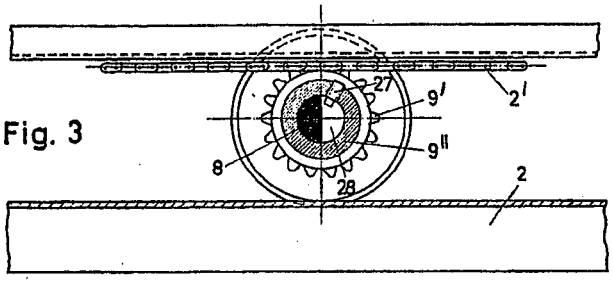


Fig. 3



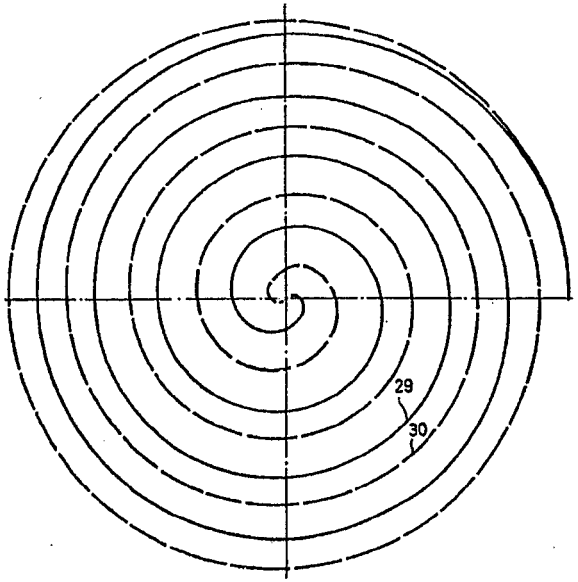


Fig. 4